DOCUMENT RESUME

ED 127 544 CG 010 773

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TITLE Cognitive Style: Ability and Preference Components.
PUB DATE 76
NOTE 6p.; Paper presented at the annual meeting of the American Educational Research Association, (San Francisco, California, April 19-23, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Academic Achievement; *Adaptation Level Theory; Children; Cognitive Ability; *Cognitive Development; *Cognitive Style; *Cognitive Tests; Educational Research; Elementary School Students; *Individual Differences; Intelligence Level; *Learning Modalities; Perception; Speeches

ABSTRACT

This study investigates the preference and ability components of cognitive style as measured by a verbal test for fifth-grade children. Performances from an intellectual ability test, a pictorial cognitive style test, and school achievement tests were included as construct validity variables. The results supported conclusions drawn by Robinson and Gray (1974) concerning the differential relationships between cognitive styles and school learning outcomes. These findings indicated that relational ability from the verbal analogies test of cognitive style were highest on the verbal comprehension factor for boys and categorical ability for girls, while lowest on the categorical preference for boys and relational preference for girls. Further interpretations indicated that cognitive style scores might be used to identify children's cognitive styles; develop teaching strategies and learning outcomes; and understand the relationships between cognitive style, intelligence, and achievement. (Author/HLM)

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ED127544

Cognitive Style: Ability and Preference Components

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The purpose of this study was to investigate the preference and ability components of cognitive style as measured by a verbal test for fifth-grade children. Performances from an intellectual ability test, a pictorial cognitive style test, and school achievement tests were included as construct validity variables. The results supported conclusions drawn by Robinson and Gray (1974) concerning the differential relationships between cognitive styles and school learning outcomes. The results in this study were interpreted with respect to the preference and ability components of cognitive style.

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CE 010 723

Paper presented at A.E.R.A., San Francisco, 1976.

Cognitive Style: Ability and Preference Components

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Objectives

The purpose of this study was to investigate the preference and ability components of cognitive style as measured by a verbal test for fifth-grade children.

Theoretical Framework

While efforts to understand how individual differences in cognitive abilities affect school achievement have resulted in conclusive findings, findings in the area of personological variables have been inconclusive (MacFarlane, 1963, Travers, 1972: Tyler, 1974). In recent years, however, considerable interest has been shown by educators in a relatively different kind of personological variable (Allport, 1961; Glaser, 1972; Kogan, 1971; Messick, 1970; Wright and Kagan, 1973). Such variables have become commonly known as cognitive styles. The most frequently quoted definition of cognitive style has been given by Kagan, Moss and Sigel (1963). They defined cognitive style as "stable individual differences in modes of perceptual organization and conceptual categorization of the external environment" (p. 74).

In view of the historical account of the study of personological variables, it seems pertinent to raise the question of how cognitive style is different theoretically from previously investigated personality traits. First, cognitive style has developed as a variable which is at the crossroads of an individual's cognitive and affective functioning. Second, cognitive style evolved from developmental theory rather than from an adult model. Third, cognitive style is viewed as a task and/or situation variable rather than as a variable that generalizes across all aspects of an individual's life experiences. Its potential value as a variable for consideration in education is not only for the purpose of predicting future achievement on specific types of learning tasks but also for the purpose of matching a student of a particular cognitive style with an instructional method which might result in optimal learning for given tasks. When cognitive style is viewed in the latter sense, the term "learning style" is often substituted.

In order for a cognitive style variable to fulfill the above theoretical considerations, it must of necessity have both an ability and a preference component. At this point, it is crucial to define ability and preference and relate them to cognitive style. Preference is usually defined in terms of an individual's tendency to use a particular mode of conceptualization when confronted with situations in which different modes could be used. That is, preference is an individual's characteristic manner of responding to diverse cognitive tasks regardless of the appropriateness of the responses. Ability, on the other hand, is a term commonly used to signify the level at which an individual can solve cognitive tasks correctly. In addition, ability is usually associated with an individual's adaptability in solving diverse cognitive tasks. Thus, the underlying factors of preference are the manner of and the consistency of behavior while the underlying factors of ability are level of and adaptability of behavior across cognitive tasks. Individual differences in cognitive styles can be in reference to differences in abilities or preferences.

When the ability component has been removed from a cognitive style measure, style behavior has acted much like traditional personological variables (Coop and Brown, 1970; Denney, 1974; Kagan, Moss and Sigel, 1963). When the preference component has been removed from such measures, cognitive style has acted much like traditional intellectual ability variables (Kagan et al., 1963; Hornsby and Olver, 1966; Denney, 1971; Gray, 1974; Robinson and Gray, 1974; Salomon and Achenbach, 1974). The problem then is to develop measures of cognitive style which contain an optimal amount of each component so that information about an individual's cognitive style can be useful for prediction and intervention purposes (Gray, 1974).

Method

One-hundred-thirty-four fifth-grade children (67 boys, 67 girls) from a mid-western county school district served as Ss.

The instruments used in the study were a form of the Conceptual Style Test (CST) developed by Kagan (1968), and a verbal analogies test of cognitive style (ATCS) studied by Robinson (1973). The form of the CST is a multiple choice version (MCCST) studied by Cohen (1972). Scores of recently administered standardized ability and achievement tests were obtained for Ss from school records. IQ scores were based on performances on the Otis-Lennon Mental Ability Test and achievement scores were based on performances on the Iowa Test of Basic Skills.

Ss were administered the ATCS and the MCCST. Testing was group administered in intact classrooms. All testing was done during a two-week period in the spring of the year.

The CST contains 19 triad picture items of people, animals, plants and common objects. The S's task is to group two of the three pictures in some way and give a reason for the grouping. Each response for the S is scored as categorical, descriptive, or relational. Thus, a S is supplied with multiple choice alternatives. The alternatives are based on actual responses that intermediate elementary grade children had previously given to the free-response CST. The scoring prodecures for the MCCST are identical to the CST. The concurrent validities of the same style across the CST and MCCST is unity (1.00) after the reliabilities have been corrected for attentuation.

The ATCS is made up of 42 verbal analogy items with multiple-choice alternatives. The words in the stems and alternatives of the items also represent people, animals, plants and common objects. Fourteen of the items on the ATCS are designed to measure a subject's correct use of each of the three cognitive styles. The foils for each item consist of two alternatives which represent the style responses not being measured by the particular item and a high associative response of the same style response being measured but which is irrelevant to the relationship expressed by the analogy. Hence, there are three sets of scores which may be obtained from a S's responses to the ATCS: correct responses for each style (ability scores); error responses for each style (preference scores); and the total number of responses given for each style (cognitive style scores).

Results and Conclusions

For the purpose of this proposal, descriptive statistics are presented in Table 1. Scores from the ATCS and MCCST are in raw score units, scores from the Otis-Lennon are in deviation IQ units and scores from the Iowa Test are in grade equivalent units. Factor analyses (Varimax and Oblique rotations of initial Principal Factor solutions) were performed separately for boys and girls. All of

the variables of the study were included. Multivariate analysis of variance were used to study more extreme style Ss. The latter analyses are necessary because of the confusing nature of cognitive style scores resulting from ipsative scoring. For the analyses of variance, style scores from the MCCST, IQ scores, and subtest achievement scores (vocabulary, reading comprehension, language skills, work-study skills and mathematical skills), in turn, were used as dependent variables. Independent variables were cognitive style (categorical, descriptive, relational, categorical-descriptive, categorical-relational, descriptive-relational and flexible groups based on extreme performances on the style scores from the ATCS) and sex.

From the factor analyses, five factors were identified for each sex: verbal comprehension; descriptive style as measured by the ATCS; categorical and relational style as measured by the ATCS and MCCST; descriptive style as measured by the MCCST; and a cognitive ability factor from the ATCS. In general, the following conclusions can be drawn from these analyses. Relational ability from the ATCS loaded highest on the verbal comprehension factor for boys and categorical ability for girls while categorical preference from the ATCS loaded highest negatively for boys on this factor and relational preference for girls. These findings support the conclusions of Robinson and Gray (1974) concerning the role of cognitive style in school learning for boys and girls. Descriptive style is more closely related to descriptive ability than categorical style is to categorical ability and categorical style is more closely related to categorical ability than relational style is to relational ability. Of the style factors, only descriptive style and the cognitive ability factors had substantial loadings from the IQ and achievement variables. The nature of the loadings on these factors were different for boys and girls.

From the multivariate analyses, the following conclusions can be drawn. Categorical, descriptive and relational Ss tended to use the same style respectively on the ATCS and MCCST. Descriptive and relational boys obtained higher IQ scores than girls of these styles respectively. Flexible style girls obtained high IQ scores than boys of this style. The mean IQ scores of boys and girls of the other style groups were similar. Flexible style Ss obtained significantly higher scores than relational style Ss on vocabulary and reading comprehension; descriptive style Ss obtained higher scores on language skills than relational style Ss; descriptive-relational Ss obtained higher scores on work study skills than relational style Ss; and descriptive Ss obtained higher scores than relational style Ss on mathematical skills. There were no significant differences in the mean performances of other style groups in pairwise comparisons.

Educational Significance

The results of this study support the differential relationships among IQ, school achievement and cognitive style behavior reported by Robinson and Gray (1974). In this sense, the study has served as a replication of previous findings. However, the contents of the proposed paper contain precise analysis of the role played by cognitive style in school learning. In addition, some evidence is available related to how cognitive style scores might be used for the purpose of identifying children of a particular style for possible intervention as well as for the purpose of predicting school learning outcomes and understanding the relationships among cognitive style, intelligence, and achievement.

TABLE 1

Descriptive Statistics of the Variables

Variable	Boys M	Boys SD	Girls M	Girls SD	Total M	Total SD
ATCS						
Categ.-Ability	10.5	3.0	11.1	2.7	10.8	2.8
Desc. -Ability	9.5	3.4	10.9	3.0	10.2	3.3
Relat.-Ability	9.8	2.3	10.6	2.2	10.2	2.3
Categ.-Preference	4.5	3.1	3.8	2.9	4.1	3.0
Desc. -Preference	2.7	2.1	2.0	1.4	2.4	1.8
Relat.-Preference	3.9	3.4	2.9	3.4	3.4	3.4
Irrel.-Preference	1.0	1.0	0.9	1.0	0.9	1.0
Categ.-Style	15.0	2.8	14.9	2.6	14.9	2.7
Desc. -Style	12.2	2.8	12.8	2.4	12.6	2.6
Relat.-Style	13.8	3.0	13.4	2.5	13.6	2.7
MCCST						
Categ.-Style	8.2	3.9	8.1	3.8	8.1	3.8
Desc. -Style	7.2	4.0	6.7	3.4	6.9	3.7
Relat.-Style	3.6	2.7	4.3	2.9	3.9	2.8
OTIS-LENNON						
IQ	109.8	12.8	112.9	12.5	111.4	12.7
IOWA TEST						
Vocabulary	5.4	1.7	5.8	1.5	5.6	1.6
Reading	5.4	1.4	5.9	1.4	5.7	1.4
Language	5.4	1.5	6.5	1.4	6.0	1.6
Work-Study	5.7	1.4	5.9	1.2	5.8	1.3
Mathematics	5.9	1.4	6.2	1.2	6.1	1.3